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# Microelectronic Status Analysis and Secondary Part Procureability Assessment of the Multiple Launch Rocket System (MLRS)

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AMCOM Industrial Operations Division (IOD) required engineering support in performing microelectronic technology and availability assessments for several hundred items and in assessing the impact of nonavailability on the MLRS weapon system. IOD also required engineering support in performing producibility analyses of the MLRS weapon system. In order to facilitate the assessment of this system, the Systems Management and Production Laboratory at The University of Alabama in Huntsville Research Institute was tasked to conduct an in-depth analysis as to the life cycle health of the MLRS weapon system's component parts.

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# PREFACE

This technical report was prepared by the staff of the Research Institute, The University of Alabama in Huntsville. The purpose of this report is to provide documentation of the work performed and results obtained under Delivery Order 93 of AMCOM Contract No. DAAH01-92-D-R006. Mr. Gary Maddux was the principal investigator. Mr. Doug Johnston, Industrial Operations Division, Systems Engineering and Production Directorate, Research, Development, and Engineering Center, U.S. Army Aviation & Missile Command, provided technical coordination.

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other official documentation.

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Prepared for: Commander
U.S. Army Aviation & Missile Command
Redstone Arsenal, AL 35898

I have reviewed this report, dated 29 Jul 99 and the report contains no classified information.

Gary A Maddux
Principal Investigator

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## 1.0 Introduction

The Industrial Operations Division (IOD), SEPD, RDEC, AMCOM has the mission and function of providing microelectronic technology assessments, and producibility and supportability analyses for the MLRS system. IOD evaluates the impacts of nonavailability of microelectronic parts on the life cycle supportability of the MLRS system and evaluates the producibility of the MLRS system. IOD required engineering support in performing microelectronic technology and availability assessments for several hundred items and in assessing the impact of nonavailability on the MLRS system. IOD also requires engineering support in performing producibility analyses of the MLRS system.

In order to facilitate the assessment of this system, the Systems Management and Production Laboratory at The University of Alabama in Huntsville Research Institute was tasked to conduct an in-depth analysis as to the life cycle health of the MLRS weapon system's component parts.

## 2.0 Objective

The purpose of the work to be performed under this task order was to provide engineering support to analyze the availability of microelectronics used in the MLRS system and to investigate and develop solutions for problem parts. General microelectronic engineering support was required to support special studies involving microelectronic components and obsolescence impacts to systems and subsystems of the MLRS weapon system. Determination of the producibility of the MLRS system and/or subsystem was required.

## 3.0 Statement of Work

The statement of work, as outlined in delivery order 93, was as follows:

3.1 UAH shall analyze the availability of microelectronic parts used in the MLRS weapon system. The analyses shall be for microelectronics specifically identified by the IOD. UAH shall assess the impact of the nonavailability of the microelectronics on system supportability, reference SOW, Section 2, (7). UAH shall evaluate problem resolution approaches. UAH shall identify opportunities for insertion of new electronic technologies to resolve microelectronic availability and obsolescence problems, reference SOW, Section 2, (7). The analyses will be performed using government furnished databases and automated tools such as the Microcircuit Obsolescence Analysis Tool (MOAT) local area network and with the TACTech information service which will be furnished by UAH.

3.1.1 UAH shall define microelectronic component obsolescence assessment methods and analyze current government obsolescence assessment methods,

reference SOW, Section 1, b. Additional approaches shall be developed as required. Analysis methods, data sources, criteria and reporting formats shall be documented within all written reports.

3.1.2 UAH shall purchase the TACTech information service for a one year subscription. The TACTech information service shall be located at the IOD facility at Redstone Arsenal.

3.1.3 UAH shall research and analyze the MLRS microelectronic component availability data. Commercial and government databases shall be searched for data on microelectronic obsolescence and availability. Alternate sources, part numbers and qualified substitutes for obsolete or unavailable parts shall be identified. Compliance with military and commercial standards shall be verified. Specific alternate and substitute parts for those determined obsolete or determined to pose obsolescence potential shall be recommended, reference SOW, Section 1, b.

3.1.4 UAH shall assess MLRS system readiness, producibility, and supportability impacts resulting from microelectronic obsolescence. Specific component availability and obsolescence problems affecting the MLRS system shall be identified. Quantitative statistics to demonstrate the impacts at the system, line replaceable unit (LRU), circuit board and component levels shall be derived. Potential approaches to resolve availability and obsolescence problems and reduction of their impacts on system supportability shall be proposed, reference SOW, Section 2, (7).

3.1.5 UAH shall identify opportunities for insertion of new microelectronic technologies into the MLRS system, reference SOW, Section 2, (7). LRUs or boards which are candidates for redesign based on their use of obsolete microelectronics shall be identified.

3.1.6 UAH shall investigate the use of the technology insertion program to resolve deficient technical data packages (TDP), eliminate sole source TDPs, and delete Reliability, Availability, and Maintainability (RAM) problems. Benefits in terms of improved performance, producibility, readiness and life cycle costs shall be demonstrated.

3.2 UAH shall analyze the producibility of the MLRS system and subsystems, reference SOW, Section 1,b. The analyses shall be performed on parts specifically identified by the government. UAH shall analyze TDP data (listings, engineering documentation and changes thereto) to advise the government if the present baseline and/or detail drawings are adequate for competitive procurement and/or manufacture. UAH shall, during TDP analysis, document any cost reduction opportunities in the TDP, using value engineering methodology as a generally accepted practice of cost analysis. UAH shall provide a written report

for each TDP analyzed. UAH shall provide recommended TDP updates where applicable.

3.3 UAH shall perform an engineering analysis on producibility problems identified during the procurement cycle of MLRS secondary items. The analysis will require review of drawings, specifications, and related materials. UAH shall determine and recommend solutions to the producibility problems and provide rationale to support recommendations. UAH shall, during engineering analysis, document any cost reduction opportunities in the TDP, using value engineering methodology as a generally accepted practice of cost analysis. Results of the analysis shall be prepared and furnished in a written report.

## 4.0 Assessment of the MLRS System

Under this task members of the UAH Systems Management and Production Lab performed a detailed engineering analysis on the component parts of the MLRS weapon system. Specifically, microelectronic components were analyzed according to their availability and expected life cycle. To ascertain this information, UAH worked with the electronics industry, the MLRS Project Office, and other government agencies.

The results of this task were published in the *Microcircuit Obsolescence Assessment of the MLRS* and delivered to IOD under separate cover.

## 5.0 Conclusion and Recommendations

During the time frame allocated by the delivery order, members of the UAH Systems Management and Production Lab, with the cooperation of representatives from AMCOM Systems Engineering and Production Directorate and the MLRS Project Office investigated the life cycle supportability of the microelectronics of the MLRS weapon system. Because of the rapidly changing microelectronics industry, it is imperative that this assessment be refreshed on a periodic basis. Only through the diligent monitoring of a complex system can its sustainability issues be properly addressed. It is recommended that the MLRS weapon system adopt a proactive obsolescence management philosophy so that the total cost of ownership is reduced over the system's life cycle.